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ABSTRACT

Component aspects of Program for Learning in Accordance with Needs (PLAN), a systems approach to individualized education on the elementary and secondary school levels, are discussed. PLAN, which has been in operation in twelve selected school districts in California and in the northeastern U.S. since 1966, focuses on assisting the individual to learn about educational, occupational, avocational, and social roles and activities, and to plan his development to utilize his potentialities in ways maximally satisfying to him. PLAN includes instruction in language arts, social studies, science, and mathematics as well as the student-centered individual development program. PLAN is considered in terms of: (1) specific educational objectives, (2) learning methods and materials, (3) evaluation, (4) guidance and individual planning, (5) teacher development, and (6) computer services. Use of PLAN in an elementary school in California during the 1967-70 academic year and individual evaluation of the program by the teachers involved in it are noted. It is concluded that the availability of such a comprehensive system for individualized instruction does not ensure its effectiveness in the classroom but remains a function of the interaction between student, teacher, and administrator. (AE)

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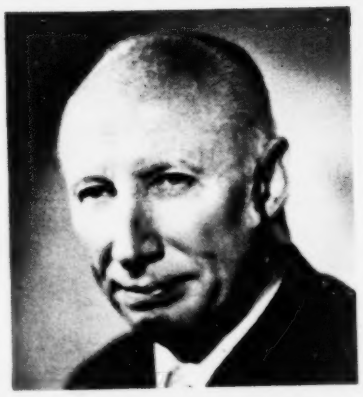
The Plan System For Individualizing Education

JOHN C. FLANAGAN



John C. Flanagan

ABOUT THIS REPORT

Modern society has bestowed upon schools the responsibility for educating an increasingly diverse group of students for an increasingly diverse and complex society. This task creates difficult problems from a pedagogical standpoint, to say nothing of practical considerations. Many observers feel that if there is any hope in individualizing instruction and career planning, it must lie in some form of computer-assisted systems approach.

Project PLAN is one such approach which has now gained several years experience in developmental work and practical application in a number of school systems. This description amply illustrates both the complexity and the promise of such systems. It also dramatizes the profound changes in the functions of the teacher and the role of measurement which will likely ensue as more and more sophisticated systems approaches are developed.

The author is the father of PLAN along with quite a few other research and development projects in education and psychology. Dr. Flanagan is internationally known as a professor, scientist, business executive, military psychologist, educational consultant, and author. In addition to being Chairman of the Board of American Institutes for Research, he has served as President of a number of professional organizations. Project PLAN represents his latest career.

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Education has changed a great deal in the Twentieth Century because of changing answers to three questions — first, who should be educated; second, what should they learn; and third, how should they learn it. From a situation in the Nineteenth Century in which the prevailing view was that very few children should be educated, there has been a dramatic change to a real effort to provide both elementary and secondary education for all young people. Because of the very great individual differences among children, this change from educating a few to educating everybody has required new content and new methods.

The second question, "what should these students learn," has become a very complex one involving many factors. One of these has been termed the "knowledge explosion." The accelerating rate of our increase in knowledge has changed the scope of education from the basic skills and a classical program of history, literature, foreign languages, and mathematics to a situation in which many more choices must be made.

Education in the public schools in this country has also taken on a broader role. The responsibilities of the schools now include: preparation for effective participation in an occupation; training in effective participation in social and citizenship roles; and education for cultural, avocational, and leisure time activities.

A natural consequence of the great recent increase in the extent of available knowledge is a change in the emphasis from content to abilities. The abilities most stressed include reading comprehension, reasoning, decision-making, and similar skills. Perhaps the most important change with respect to what the student should learn is the trend towards a truly individualized educational system aimed at meeting the specific needs of each individual student.

The third question, "how should students learn," has been greatly complicated by advances in educational technology. Education is changing

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from a lecture, textbook, recitation program to one which involves substantially greater participation by each student through the use of audiovisual media and new forms of printed materials. The electronic computer is also becoming a resource for both learning and the management of learning.

The systems approach to education developed from experience in designing and producing various types of complex equipment. Essentially, the systems approach makes the various steps in the development of the system comprehensive, rational, and explicit rather than partial, subjective, and implicit. As applied to education, it is useful to think of the systems approach as including the following six major steps:

1. Define the objectives in specific terms.
2. Develop tests and performance standards to measure the attainment of the objectives.
3. Identify or develop the types of procedures which indicate most promise for the efficient achievement of the objectives.
4. Implement the system.
5. Evaluate the effectiveness of the system and revise the system to improve its performance.
6. Continue the implementation, evaluation, and revision cycle.

Measurement, therefore, has a central role in any application of the systems approach. It is essential that the developer have precise evaluations of the extent to which the objectives of the system are being met. These assessment procedures must be both comprehensive and valid if the system is to perform its intended function.

The trends and conditions outlined above indicate the need for a new approach to education. The more immediate cause for the development of a Program for Learning in Accordance with Needs (PLAN) was Project TALENT. The survey in 1960 of a representative sample of students in the ninth, tenth, eleventh, and twelfth grades made it quite clear that the very wide individual differences were not adequately being cared for by such make-shifts as homogeneous grouping. A large fraction of the students were being exposed to quite inappropriate educational experiences. It also appeared that the skill levels achieved in areas such as reading comprehension and arithmetic reasoning were not sufficient to prepare these students to cope with the problems of Twentieth Century living. The survey also suggested, and the one year and five year follow-ups of these students confirmed, that the guidance and planning procedures available to these students were quite ineffective in assisting them in selecting appropriate long-term goals and developing realistic plans for attaining these goals.

PLAN focuses on assisting the individual to learn about educational, occupational, avocational, and social roles and activities and to plan his own development to utilize his potentialities in ways which will be maximally satisfying to him. The functions of the PLAN system of education, with respect to individual development, are to assist each student to:

1. Acquire information about available choices regarding occupational roles, leisure time activities, and social and civic responsibilities.
2. Understand the nature of individual differences, the principles of learning and behavior modification, and the development of abilities, interests, and values.
3. Estimate, as accurately as possible, the level of development of his own abilities, the extent of his knowledge about specific fields, and his current interests, values, and related characteristics.
4. Develop skills in planning and personal decision-making.
5. Formulate immediate and long-range educational, occupational, leisure time, and social and civic goals based on the information and skills outlined in the preceding four activities.
6. Take responsibility for carrying out his individual development.
7. Develop the ability and skills required to manage his own individual development program.

The PLAN individual development system was the joint effort of the American Institutes for Research, the Westinghouse Learning Corporation, and twelve school districts* in California and the northeastern part of the country. The program included instruction in language arts, social studies, science, and mathematics as well as the student-centered aspects of the individual development program. In the first year (1966-67) the program was developed by the staff and teachers from the cooperating school districts for Grades 1, 5, and 9. In each of the next three years the program at all three levels was extended one grade so that by 1969-70 Grades 1 through 12 were covered.

The basic components of the PLAN individual development system include: (1) a set of educational objectives, (2) learning methods and materials, (3) evaluation, (4) guidance and individual planning, (5) teacher development, and (6) computer services.

A Set of Educational Objectives

In developing the educational objectives to provide the framework for the educational program, it was decided that mastering each objective should require about two or three hours of learning time. Another arbitrary decision was that about five objectives would be included in each module. Thus a module was expected to require about two weeks time for the average student.

In addition to the module objectives from among which a student's program was selected,

*Bethel Park School District, Bethel Park, Pa.; Hicksville Public School District, Hicksville, N.Y.; Penn-Trafford School District, Harrison City, Pa.; Pittsburgh Public Schools, Pittsburgh, Pa.; Quincy Public Schools, Quincy, Mass.; Wood County Schools, Parkersburg, W. Va.; Archdiocese of San Francisco, San Francisco, Calif.; Fremont Unified School District, Fremont, Calif.; San Carlos Elementary School District, San Carlos, Calif.; San Jose Unified School District, San Jose, Calif.; Santa Clara Unified School District, Santa Clara, Calif.; Union Elementary School District, San Jose, Calif.

there were a number of intermediate objectives formulated. These required a longer period than two weeks to learn. There were also the long-range types of objectives such as the general abilities of reading comprehension, arithmetic reasoning, and similar basic skills and abilities. These were tested annually. The specific objectives written were based on a general scope and sequence developed for a particular subject matter field based on the recommendations of the national curriculum advisory panels in each of the four fields.

Learning Methods and Materials

In developing PLAN it was proposed to identify the most effective learning methods and materials available for achieving the educational objectives selected for the program. In the past 15 years the federal government has spent well over 100 million dollars on the development of new curriculum materials in various subject matter fields. Very few of these materials have been adequately evaluated. It therefore seemed more appropriate to develop a program using these materials which would make it possible to evaluate their effectiveness than to attempt to develop new instructional materials.

As indicated above, the program was built around the educational objectives. To assist the student to learn the materials necessary to indicate mastery of the objective, teaching-learning units were developed. Figure 1 gives an example of a teaching-learning unit prepared to accompany materials usually taught at the seventh grade level.

There are usually two or more teaching-learning units covering the same objectives. An effort is made to match the learning characteristics of the student with the requirements of the various teaching-learning units available. Insofar as possible, an attempt is made to provide a variety of learning experiences to assist the student to achieve each objective.

By studying the performance on the test items used to measure the achievement of a particular objective, weaknesses in the learning experiences can easily be found. Learning experiences in the teaching-learning unit used can be supplemented or replaced when the student's performance indicates the experiences were ineffective. It has been found that the comments of students and teachers provide a very valuable supplement to the item-analysis data in making such revisions.

Evaluation

The mastery of the objectives included in each module is measured when the student finishes the teaching-learning unit for that module. The answers to the module tests are recorded on IBM cards which are optically scanned at the terminal and the student's responses are scored by the central computer. The student is expected to master each of the objectives before going on to the next module. If all items on all objectives are correct, he is told to go on to the next module without further action. If he misses only one of several questions on an objective, the student is asked to review it on his own. If his performance is not quite this good, the teacher is requested to certify his mastery of the objective after he has

LIVING SYSTEMS IN SPACE

Step 1. OBJECTIVE
Describe the technological advances for counteracting each of the following conditions in outer space which permit man to establish a closed ecological system in his space craft: (1) lack of gravity, (2) absence of food, (3) decreased air pressure, (4) extremes of temperature, and (5) lack of oxygen.

USE	DO
Today's Basic Science: The Molecule and the Biosphere, Teacher's Edition, John Gabriel Navarra, et al. (Harper & Row, 1965)	(a) Read pp. 428-429. For use during the next five to ten days, set up a balanced aquarium. See instruction on pp. 430-431. Set up the aquarium now, before going any further with this TLU. You may use any aquarium that may be already set up in the classroom. (b) From your readings in Activity (a), list those items that are necessary for the survival of man. (c) Your list should include all the conditions listed in the objective, except gravity, and more. Gravity is not really necessary for man to survive in space but does cause more problems when there is no gravity.
Life Science, Singer Science Series, Teacher's Edition Helen Dolman MacCracken, et al. (The L. W Singer Company, 1968)	(d) Read pp. 302-305, the section "What effect does weightlessness have on man." (e) Do the activity on p. 303, "Collect pictures."

Figure 1. A portion of a Teaching-Learning Unit in Science.

reviewed the unit and before he goes on to the next module. If his performance on the module test indicates a failure to master some of the objectives, he is required to retake the module test after further study of the same or another teaching-learning unit.

For the most part, the items in the module test are intended to measure objectives learned in the study of this module only. Occasionally, an objective is placed in a module which represents cumulative learning over several modules. The objective is placed in the module to indicate that mastery is anticipated by the end of this particular module.

Items similar to those in the tests given at the end of the module are included in PLAN Achievement Tests given after a group of modules have been completed. This provides an opportunity to check on retention and verify the module test findings. Certain long-range goals, such as vocabulary, reading comprehension, and arithmetic reasoning, are evaluated annually in the late spring. These tests are called Developed Ability Performance Tests and are used to assist the student with his educational and vocational planning.

Pupils who are in kindergarten in the spring and anticipating entering the first grade in the fall are evaluated by the kindergarten teacher on a twenty-item Readiness Report Form. It is expected that the teacher will have much of the information and will be able to answer many of the questions without further assessment of the pupil. Ten of the items relate to the readiness of the student for

reading activities, and in preliminary tests some of the items yielded biserial correlation coefficients as high as 0.40 and 0.47 with the Stanford Achievement Paragraph Meaning Test given a year later at the end of the first grade. These ten items referred to such abilities as the discrimination of "t" and "p" sounds and the naming of all of the letters of the alphabet. The results from this Readiness Report Form have been found to be very valuable in placing the beginning students in appropriate learning activities when they start school in September.

The PLAN system of education has many other important objectives which are not measurable by procedures of the types discussed above. In an effort to develop procedures for assessing some of these other objectives, the staff requested teachers to report critical incidents of effective behaviors believed to have resulted from the use of the PLAN system. The teachers were asked to "Think of a recent occasion when you observed a student exhibit an unusual amount of some quality such as resourcefulness, independence, initiative, self-confidence, responsibility, social sensitivity, etc., which appeared to result from the PLAN approach to education."

The critical incidents obtained (Jung, 1971) were grouped into six principal categories, such as, (1) did unusually thorough job on assigned task or continued beyond requirements of assigned or agreed-upon task, and (2) completed an unassigned civic, social, or playground activity without reminder or support from others. On the basis of these teacher's observations, some experimental evaluation procedures were developed. For each of the levels of students included at the intermediate and secondary levels, there were three exercises. The first two were common to all levels — they asked the student to list independent learning and community service activities which he had undertaken voluntarily during the past semester. The students were also given a 30 minute period to develop their ideas on an assigned topic such as improving the present educational system, improving the value and use of television, or getting more citizens involved in the decision-making process on the local and national levels. Although this must be regarded as only a pilot study, the comparisons of reports of activities from PLAN and Control classes all favored PLAN classes and the differences for two of the four grades studied, Grades 5 and 6, were statistically significant.

One general point which is of great importance in any evaluation program related to individual development is that the individual must be the unit. Evaluation purposes are not well served by reporting the mean and standard deviation of a group of students on a particular subject matter achievement test. It is necessary to know whether each of the items in the test is a relevant objective for the various students in the group. The point of interest is then, not the mean for the group, but how well the student performed on those items important for his educational aims and purposes.

Guidance and Individual Planning

There is a strong trend in American education at the present time to give young people an opportunity to participate in choosing their educational goals and planning their educational program. To enable the student to make responsible choices, it is essential that he be as adequately prepared as possible.

In PLAN, information about the world of work is presented as an applied economic strand in the PLAN Social Studies program. Other relevant information is included in Language Arts, Mathematics, and Science. At the primary level, there is an introduction to the world of work which includes such topics as community and service occupations which have been observed by young children, the general nature of the work role, including making a living and achieving personal satisfactions, the social and economic functions of various occupations, and ways that people prepare for occupations.

At the intermediate level, the student is introduced to twelve occupational families which were developed on the basis of homogeneity of interests, educational requirements, and on the basis of the similarity of their ability and interest patterns as checked empirically using Project TALENT data. The twelve occupational families are shown in Table 1.

By the beginning of the secondary level, the student must have made at least tentative educational plans consistent with his occupational goals at about the level of specificity indicated by the twelve occupational family groups. These tentative plans need to be checked in terms of his progress in developing the required abilities, and also with a view to their relation to his developing interests and values. The student should also obtain more detailed information about the nature of the occupations in the various occupational groups.

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Table 1. Long-Range Occupational Goals

1. Engineering, Physical Science, Mathematics, and Architecture
2. Medical and Biological Sciences
3. Business Administration
4. Teaching and Social Service
5. Humanities, Law, and Social Sciences
6. Fine Arts, Performing Arts
7. Technical Jobs
8. Business, Sales
9. Mechanics, Industrial Trades
10. Construction Trades
11. Business, Secretarial-Clerical
12. General, Community Service, Public Service

These decisions, of course, require considerable nowledge about the student's own level of ability nd his interests and values. In PLAN this in- ormation is provided in terms of the Developed bility Performance Tests and related biographical nd self-description instruments. Using the ALENT data, the student is informed of his pres- nt level of ability in relation to the requirements or typical jobs in the twelve occupational groups.

In order to interpret these data satisfactorily, he student is informed regarding the nature of earning. Thus, if the expected gain in ability level n reading comprehension is approximately six oints over a three year period and the student spires to educational and career goals which would require that he improve his performance in his period by about nine points, he needs to be nformed of the extent of the effort which is likely o be required of him to achieve this amount of mprovement in this particular ability.

Formulating goals and achieving them requires kill in making decisions and plans. If this were a ne-time activity, it would probably be most ef- icient for the individual to obtain a maximum of dvice and a minimum of skill. However, in present-day society, decision-making and planning are required almost continuously because of changes in the total situation. It is therefore im- portant that the student's skills in making decisions and plans be developed as fully as possible. It is also true that decisions and plans handed to the student are not as likely to be understood, retained, and acted upon as are those which he has carefully and systematically made on his own.

To assist the student in formulating a long-range occupational goal at a particular stage in his educational development, a series of eleven modules has been developed. After completing this series, the student and his parents tentatively select the educational and general vocational aspirations and goals which seem most appropriate. The first modules in the series relate to decision-making and the consequences of decision-making. These are followed by a series of five modules describing twelve occupational families in some detail. The last module before the one in which he selects his long-range goal is related to the role of personal values in goal formulation.

The basic type of figure used in this series of modules are shown in Figure 2. For the occupational group shown in this figure, the vertical line for each of the twelve tests indicates the range from −1 standard deviation to +1 standard deviation. The small horizontal line indicates the mean for this group. Males entering careers as carpenters have a mean score above the mean for all twelfth grade males in the test for visualization in three dimensions. The mean score of those entering careers as lawyers on this test is the same as that for carpenters, but it is their lowest score on any of the twelve tests, whereas the mean score of carpenters is their highest on any of the twelve tests.

The first aim of the program is to assist the student in formulating long-range goals and developing reasonable plans for attaining them. Following this, it is essential that he accept the responsibility for his own individual development and acquire the management skills to enable him to modify his behavior to insure that he carries out this individual development program.

Teacher Development

This program consists of three segments given in the spring, late summer, and early fall. These might be described as orientation, instruction, and performance. The activities in the spring are aimed at understanding the general nature of the teacher's role in the PLAN system. Two days are devoted to structured observation by the teachers of PLAN

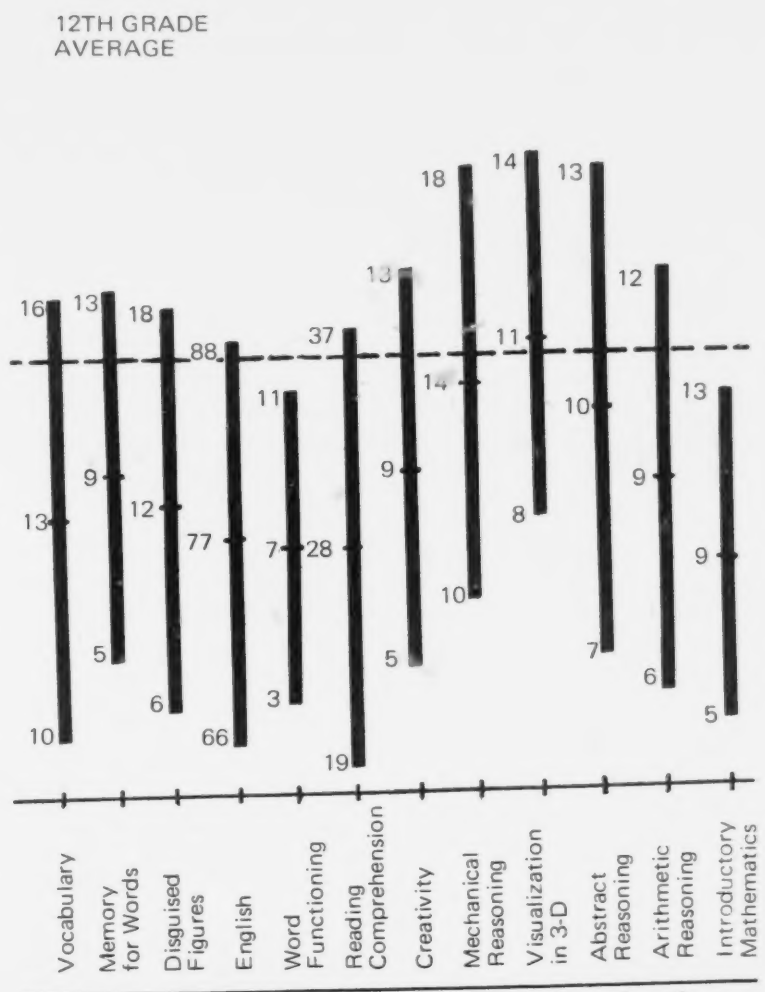

Figure 2. Means and Standard Deviations for the Scores on 12 Tests Achieved by Male Students Who Five Years Later Were Planning Careers as Carpenters.

classrooms in action. Each teacher, guided by an observation form, observes three classrooms during this period and also spends time at the end of each day discussing what has been observed. The third day of the orientation phase is spent on an individualized exercise consisting of a module on classroom organization.

In the instructional phase in August, which consists of three days of computer-supported individualized instruction each teacher completes several modules. These are on the curriculum, the orientation of students, the computer support of the program, basic procedures for individualizing student programs, and a review of the module taken in the spring on classroom organization.

The performance phase of the teacher development activities is primarily aimed at confirmation that the instructional program has been successful in bringing the teacher to the performance standards set. The Far West Regional Educational Laboratory's mini-course on tutoring is used by the teacher. This course is self-administered and enables the teacher to verify using audio or video tape equipment that the tutoring skills have, in fact, been mastered. Each of the other instructional objectives pertaining to classroom performance is checked by the consultant with the teacher to insure that all of the necessary information and skills have been acquired.

Computer Functions

In PLAN the computer and the computer terminal located in the school building perform two main functions, (1) monitoring the student's individual progress and (2) assisting in the planning of his individual development program. The school building terminal consists of an IBM 2956 optical card reader and an IBM 2740 automatic typewriter. These are connected with the central computer by means of a telephone line. Small batches of cards are transmitted from the terminal throughout the day and checks are used to prevent incorrect data from being processed.

The computer performs its monitoring function primarily through the daily processing of module test results and status cards. The cards received by the terminal are batch-processed at the end of the day after further editing by the computer. Thus, the teacher has printout pages giving information on student test results, students ready for small group activities, changes in programs of study, etc. In addition to this daily processing, the monitoring of the student's progress is facilitated by monthly or quarterly progress reports indicating the extent to which the student is proceeding on the schedule planned at the beginning of the year.

To aid the student in planning for his individual development, the computer provides information about his present level of abilities and other learning characteristics, thus assisting him to formulate long-range goals.

The computer also assists the student in the development of a program of studies. In PLAN there are three steps in program planning. The first step is to place the student at a point on each scale where he knows the earlier modules but does not know the later ones. Placement is based on previous records and performance on PLAN Achievement Tests which review mastery of completed modules. The second step is the assignment of a "quota" for the academic year. This is based on the number of modules completed by the student in the previous year and on his performance on the most relevant of the Developed Ability Performance Tests. The third step involves selection of the specific modules to be included in the program of studies and choice of the particular teaching-learning units to be used to master the objective. This requires extensive computer assistance and a long set of decision rules.

These rules start with state and local requirements for specific subjects. For students in the higher grades, the next important consideration is the student-parent selected long-range career goal and the data-suggested goal for this student. Other factors considered include the interests and learning characteristics of the student. Using all available data supplied by the student and parent and his previous teachers, the computer recommends a specific program of studies. This program usually provides a number of opportunities for the student and teacher to make specific suggestions from among several appropriate sets of modules based on current interests or related factors. A sample Program of Studies is shown in Figure 3.

A secondary function of the computer, not directly related to the operating of the program, is the improvement of the PLAN materials. The accumulation of the data in the computer makes it possible to analyze the performance of various types of students on specific module test items. These can be related to the learning materials used and appropriate revisions made to improve the effectiveness of the learning program.

PLAN IN THE DARTMOUTH SCHOOL

In the academic year 1969-70, two seventh grade classes, a total of 69 children, were enrolled in PLAN in the Dartmouth School. These students were taught by Tod Hodgdon and John Scott. Mr. Hodgdon had spent the academic year 1968-69 working with eleven other teachers from the schools participating in PLAN to develop a program for the seventh grade. John Scott received only the brief type of teacher preparation described above before undertaking this assignment. The principal, Lloyd Krelle, gave these teachers a relatively free hand as was the tradition in this school and encouraged them to innovate in ways which seemed appropriate to them.

The Dartmouth School is part of the Union Elementary School District, located in San Jose, California. Some of the students entering these PLAN seventh grade classes had been in PLAN classes in the Mirassou School in this district in their fifth and sixth grades. Others were new to PLAN in the seventh grade. Mr. Hodgdon took the responsibility for instructing these students in mathematics and social studies and Mr. Scott was responsible for their work in language arts and science.

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PROGRAM OF STUDIES

SLIPPERY ROCK ELEMENTARY

SOCIAL STUDIES FALL 1970

Mod. No	Module Name	Times Tested	Date Start	Date Finish
	YOUR TEST RESULTS SUGGEST THAT YOU KNOW SOME OF THE OBJECTIVES OF THESE MODULES IN YOUR PROGRAM OF STUDIES. AFTER REVIEWING THE MODULES, YOU SHOULD CONSIDER CHALLENGING THEM.			
42-556-2	WORLD PROBLEMS AND ORGANIZATIONS			
	THE FOLLOWING MODULES ARE SUGGESTED FOR YOUR PROGRAM OF STUDIES FOR THIS YEAR.			
44-557-2	UNITED STATES FOREIGN POLICY			
44-559-3	RACES OF MANKIND			
ESTABLISHMENT OF A GOVERNMENT (COMPLETE 3 OF THE FOLLOWING 5 MODULES. WHEN YOU ARE READY TO BEGIN WORK ON THIS SET, ASK YOUR TEACHER TO START SET NUMBER 47-329.)				
44-601-2	GOVERNMENT IN EARLY SOCIETIES			
44-602-2	EUROPEAN MONARCHISM			
44-603-2	DEVELOPMENT OF DEMOCRACY IN ENGLAND			
44-604-2	DEMOCRACY IN FRANCE			
44-605-2	TWENTIETH CENTURY DICTATORSHIPS			

Figure 3. A portion of a Program of Studies in Social Studies.

In addition to the standard PLAN program for the seventh grade, these teachers added a few modifications of their own. Thus, for part of the year, they had all 69 children together in a double classroom and allowed students a good deal of freedom in selecting the subjects they wished to study at any given time. After a few months trial, they gave this up because with this number of students together they felt they did not have time to get to students who weren't making adequate progress, but who were less aggressive about indicating their needs for help to the teachers. They reported the periodic print-outs from the computer were of considerable help to them in identifying the students who were lagging behind, but they found it difficult to ignore the bright students moving rapidly ahead who asked for assistance in favor of students who seemed to prefer just to vegetate and who didn't want to get intellectually involved in the types of materials made available to them.

John Scott reported that another innovation used was an incentive system using the yellow packing cards inserted in each package of teaching-learning units as tokens. Students were awarded one of the yellow tokens if they obtained a perfect score on the module test the first time they took it. They were also awarded a yellow token if they completed their scheduled number of modules in the month for a particular course. Each yellow token entitled the holder to a 20-minute period of recreational activity of his choosing.

In a letter written by Ted Hodgdon to Dr. William M. Shanner last July, Mr. Hodgdon says: "Classroom involvement with Project PLAN was, without qualification, the most rewarding experience I've had in fifteen years of teaching. I cannot say that the entire year was one unbroken flow of rhythmatic bliss. It hurt a little now and then . . . Down days will undoubtedly appear next year. I look forward to them, however, because those are the days that are most instructive for me. In many ways, I was first year teacher all over again . . . The big step for me was to let go of the reins and concentrate my attention on what the students' needs were *as expressed by the student . . .*

"Once the interaction started, something significant began to happen. I found that when I was talking, it was because a student had initiated the conversation. The student was displaying a need to know . . .

"Some of the interesting outcomes for the students should be mentioned. Henry Jackson (name changed), for instance, completed the eleventh level algebra course before Easter. You may recall that he did level five math early in the fifth grade and level sixth math during the first few months of grade six at Mirassou school (in PLAN classes). The next available math at the time was level nine algebra, which he completed (skipping seventh and eighth grade mathematics). He also did a part of the eleventh level algebra before he came to Dartmouth this past year. Rather than continuing a vertical development of math after Easter, Henry devoted his math time to IBM correspondence courses in FORTRAN and the 360 computer . . . Before the year ended, I asked him to take the PLAN Achievement Test in math. His scores were higher than anyone else's in all three of the tests, even though he did not work in the level seven modules being tested . . .

"In the area of citizenship, PLAN students were better behaved than non-PLAN students. Our vice-principal tallied the number of times each teacher in the school sent a student to the office for errant behavior in the classroom or out in the yard. The average was 65 referrals per teacher. PLAN teachers averaged seven per class. The explanation for this lies in the fact that PLAN students do not get bored in the classrooms. Classroom management is infinitely simpler because the typical stress situations do not exist. I hasten to add that we PLAN teachers are not creampuffs. Both of us are veterans of World War II and Korea."

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CONCLUSIONS

The PLAN system of education represents a much more comprehensive approach to individualized education than has been previously available. The explicit statement of educational objectives and the teaching-learning units representing guides to appropriate learning materials are essential for any systematic approach to the development of an explicit and effective educational program. Objectives and guides are not enough, however, to implement an effective educational program. The module tests related to each objective, the periodic *PLAN Achievement Tests* to review and confirm the continued progress of the student, along with the annual *PLAN Achievement Survey Tests* and the *Developed Ability Performance Tests* provide a solid basis for assisting the student to formulate his long-range goals and develop a program of studies to achieve these goals.

The integration of the guidance and individual planning aspects of the program into the instructional phases offers real promise for the development in the student of the basic internal motivation which will enable him to take responsibility for and manage his program of studies in such a way as to prepare himself to achieve the goals he has set for himself.

In the program the computer coupled with a terminal in the school building can provide very valuable support to the teacher in the form of record-keeping, test-scoring, predicting, and utilizing extensive data inputs by both teacher and pupil to prepare a program of studies to carry out the plans and objectives of the student.

In conclusion, it should be emphasized that the availability of a comprehensive system such as PLAN does not insure that it will be automatically effective when installed in the classroom. Any such system represents only a set of instruments and procedures which make it possible for the student to plan and carry out a program of learning in accordance with his needs with extensive assistance from the teacher and the school administrator. At best, the PLAN system can only provide a framework. The responsibility for the learning must rest on the student, guided by the teacher, and supervised by the school administrator.

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